

BUFFALO

"BEST BUILT"

DIVIDED SHELL

SINGLE AND MULTI-STAGE
CENTRIFUGAL PUMPS

BULLETIN No. 270

Buffalo Steam Pump Company

BUFFALO, N. Y. U. S. A.

Manufacturers of Steam, Power and Centrifugal
Pumping Machinery, Vacuum Pumps and Con-
densers of Every Description For All Requirements

WORKS: NORTH TONAWANDA, N. Y.

CANADIAN WORKS: BERLIN, ONTARIO, CANADA

NEW YORK
PHILADELPHIA
CHARLOTTE
BIRMINGHAM
MONTREAL

CHICAGO
BOSTON
PITTSBURG
HOUSTON
KANSAS CITY

ST. LOUIS
CLEVELAND
DETROIT
DENVER
TORONTO



BUFFALO PUMPS

BULLETIN No. 270



Fig. 1065

8 Inch Class "S" Double Suction Pump, Motor Driven.
(Shows Type of Design for 5 Inch and Larger Pumps)



Class "S" Divided Shell Double Suction Pumps



Fig. 908

Large Impeller

Owing to the wide use of centrifugal pumps for practically all ordinary and many special services at present, it is not deemed necessary to here elaborate on their many advantages and the principle of operation of this class of equipment. We have been building centrifugal single and multi-stage pumps for the last fifteen years—or since their first introduction into this country—and have been manufacturers of steam pumps of all sizes and types for the last thirty years.

The product of the Buffalo Steam Pump Co. is built with modern shop facilities in accordance with best practice as to interchangeability of parts, and the long and detailed experience of our Engineering Department especially equips us for handling unusual problems.

For those who prefer horizontally divided casing pumps this bulletin lists our line of divided casing double suction single stage pumps which we regularly build from standard patterns in sizes 1 to 48 inch discharge. Prospective customers are invited to inspect these patterns and pumps under construction. Larger size pumps or special pumps we build to order. Multi-stage pumps of the divided casing pattern are listed in two and four stage designs on which we will be pleased to offer recommendations for particular conditions of service.

Double suction volute pumps are normally rated for heads up to 150 feet, but with special heavy shells and suitable speed conditions are offered for total pumping heads of 200 feet, or 87 pounds pressure.

CAUTION: *Never operate any centrifugal pump "dry." Always prime before starting. Merely crack water seal valves to avoid putting excessive pressure on stuffing box packing. Use soft graphited packing. Do not tighten glands excessively. Air pockets in piping or air in water handled must be avoided.*

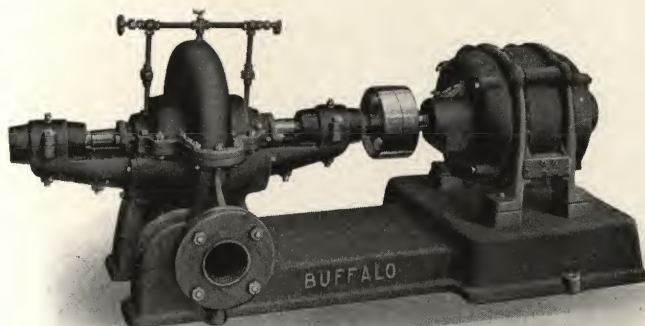


Fig. 1062

2½ Inch Class "S" Double Suction Pump, Motor Driven.
(2 Inch and Smaller Pumps Have Tapped Openings)



BUFFALO PUMPS

BULLETIN No. 270

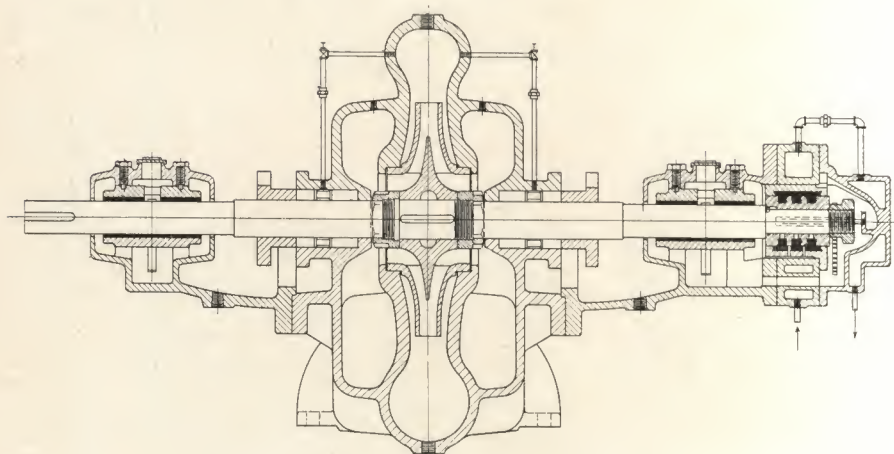


Fig. 1058

Sectional View Standard 6 Inch Class "S" Pump.

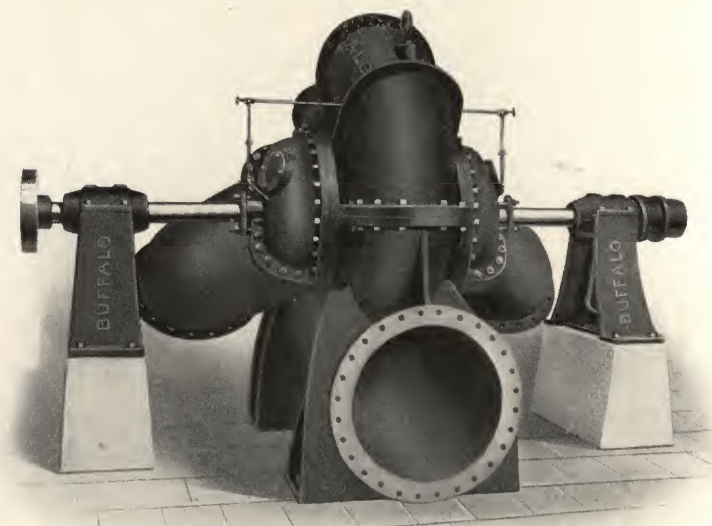


Fig. 936

36 Inch Class "S" Double Suction Pump.



B U F F A L O P U M P S

BULLETIN No. 270



NOTE—In sending inquiries to us for any style of pumping apparatus please answer the following questions as fully as possible:

1. Number of pumps required.....Type pump wanted.....
2. Capacity of each pump.....gallons per minute.
3. Total lift, including discharge, suction and pipe friction.....feet.
4. Vertical suction lift and distance from supply.....
5. Variation in lift, both discharge and suction, if any.....
6. Pump to be horizontal.....Vertical.....Submerged (?).....
 If vertical pump, state shaft length.....
7. Quality of liquid—Fresh water, gritty, acidulous, solids in suspension?.....
8. Temperature of liquid.....° Fah. Specific gravity.....
9. Service continuous.....Intermittent.....
10. If direct acting, single or duplex, steam pump. Steam pressure.....
 Condensing.....Non-condensing.....
11. Direct connected to motor. Direct current, Voltage.....
 Alternating current, Voltage.....Cycles.....Phase.....
12. Direct connected to Steam Turbine. Steam pressure.....
 Superheat.....Condensing.....Vacuum.....Non-condensing.....
13. Direct connected to Steam Engine. Steam pressure.....
 Condensing.....Vacuum.....Non-condensing.....
14. Belted—Give speed of motive power and size pulley.....
15. Motive power furnished by purchaser.....By builder.....
16. Position of suction and discharge for centrifugal pumps.....
17. Remarks (preference of type pump, etc.).....

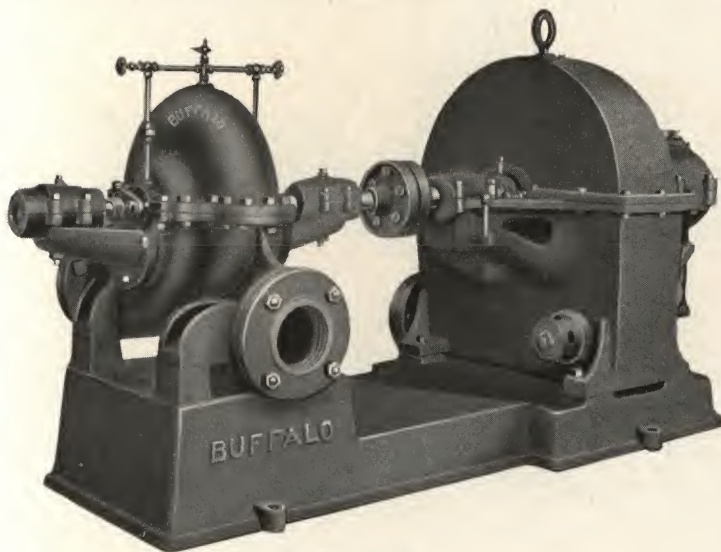


Fig. 1066

4 Inch Class "S" Double Suction Pump, Steam Turbine Driven.



BUFFALO PUMPS

BULLETIN No. 270

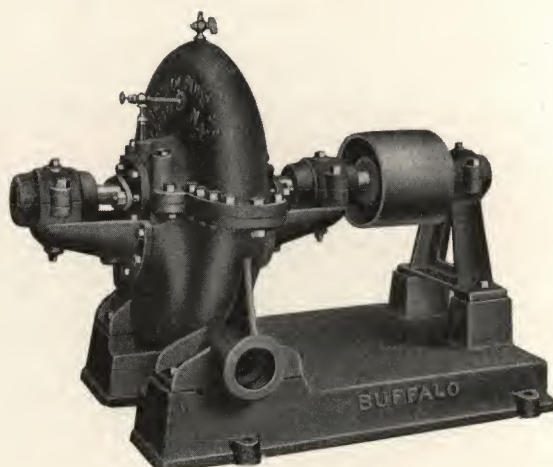


Fig. 1059

2 Inch and Smaller Class "S" Double Suction Pulley Pumps.

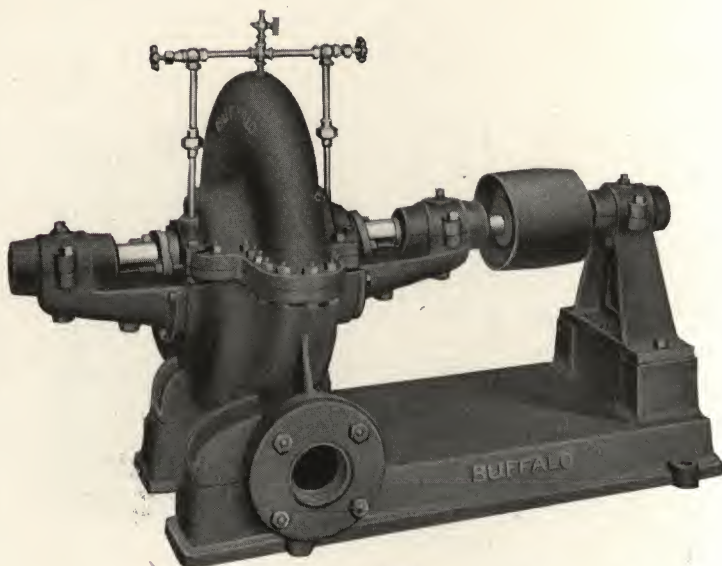


Fig. 1063

2½ Inch to 4 Inch Class "S" Double Suction Pulley Pumps.
(Larger Size Pump Ends Like Fig. 1065, Page 2)



Buffalo Double Suction Class "S" Pumps

Shells Good for 150 Feet Pressure

SPECIFICATIONS

Shell. Heavy grey cast iron, divided on horizontal center-line, machined to gauge, drilling to template. Close clearances with runner preventing leakage.

Runner. Enclosed type, hard cast iron to withstand abrasion, finished to template.

Shaft. Open hearth, machine steel, accurately finished all over. Large size shafts are hammer forged. All rotating parts assembled on shaft and balanced before putting in pump.

Bearings. Removable shell, ring-oiling, especially designed for high speed.

Thrust Bearing. Bearing surfaces water cooled on 5 inch sizes and larger, insuring perfect condition of lubricant. (Factory reserves discretion as to best type bearing to suit customer's requirements of head and running speed.)

Stuffing Boxes. Extra deep. Glands of cast iron, allowing ample packing space. Water seals and necessary connections furnished.

Flanges. Furnished on openings 6 inch size and smaller.

Couplings. Flanged, with guard protecting operator from bolts. Flexible couplings for special requirements at extra cost.

Finish. All pumps thoroughly coated inside with anti-rust paint before assembly and painted, filled and rubbed down outside, with final finishing coat. Bright parts exposed to weather protected by slushing compound.

Brass Fittings. Furnished at extra cost to suit customer's requirements for special service.

Special Pumps. Built of any metal to suit specifications of customer.

Size Pump	Pipe Sizes		Ordinary Range of Capacity Gals. per Minute		Diameter x Face Pulley	Length x Width Pulley Pump	* Code Words		
	Suction	Discharge	Normal	Maximum			Pulley Pump	With Motor Base and Flanged Coupling	With Motor Base and Flexible Coupling
1	1½	1	25	35	4 x 4	31 x 18	<i>Pabag</i>	<i>Pacah</i>	<i>Padaj</i>
1½	2	1½	55	75	5 x 5	31 x 18	<i>Pabeh</i>	<i>Pacbu</i>	<i>Padby</i>
2	2½	2	100	135	6 x 5	31 x 18	<i>Pabfu</i>	<i>Pacej</i>	<i>Padek</i>
2½	3	2½	155	210	6 x 5	39 x 22	<i>Pabij</i>	<i>Pacfy</i>	<i>Padqa</i>
3	4	3	225	300	7 x 6	39 x 22	<i>Pabjy</i>	<i>Pacik</i>	<i>Padil</i>
4	5	4	400	530	8 x 8	45 x 25	<i>Pabna</i>	<i>Packa</i>	<i>Padke</i>
5	6	5	620	800	10 x 8	69 x 28	<i>Pabok</i>	<i>Pacne</i>	<i>Padni</i>
6	8	6	900	1200	10 x 10	70 x 30	<i>Pabse</i>	<i>Pacol</i>	<i>Padom</i>
8	10	8	1600	2000	12 x 12	83 x 35	<i>Pabul</i>	<i>Pacsi</i>	<i>Padso</i>
10	12	10	2500	3100	15 x 12	92 x 42	<i>Pabwi</i>	<i>Pacum</i>	<i>Padun</i>
12	14	12	3600	4500	18 x 12	100 x 44	<i>Pabym</i>	<i>Pacwo</i>	<i>Padwn</i>
15	18	15	5500	7000	30 x 20	108 x 51	<i>Pabzs</i>	<i>Pacyo</i>	<i>Padyp</i>

*If pump is to have brass impeller add Code Word *Jcesf*.

Unless otherwise specified pumps will be furnished "right hand" for rotation in clockwise direction, standing at pulley or motor end of pump sub-base facing pump.



Buffalo Multi-Stage Divided Shell Class "R" Pumps

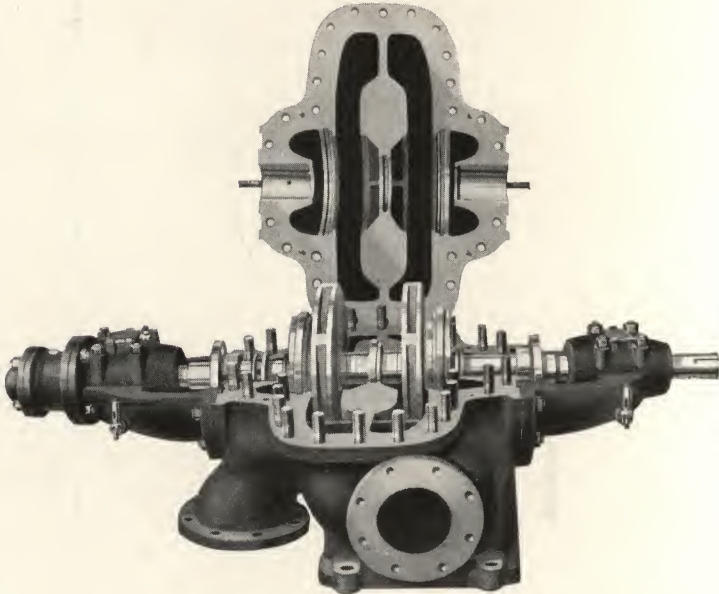


Fig. 1210
Two Stage Class "R" Pump.

Above illustration of Divided Casing Two Stage Pump with upper half of shell raised shows easy accessibility of this type of design.

Suction inlet is generally placed outboard off the end of sub-base, but should special conditions require the suction can be placed inboard between pump and motor at extra charge.

Note easily replaced "wearing" or "clearance" rings of bronze which encircle the impeller inlets and prevent leakage losses at inlets and between stages.

In the Buffalo Class "R" Divided Shell pump having even number of stages no balancing chambers are used or required on the back of any of the impellers as the suction inlets to impellers being opposed, the thrust tendency is overcome and theoretically a "balanced" pump is produced. As some accident or stoppage of a water passage may cause an unbalanced condition, it is essential to provide a substantial marine type, water cooled, thrust bearing having automatic continuous oil circulation, which is done.



BUFFALO PUMPS

BULLETIN No. 270

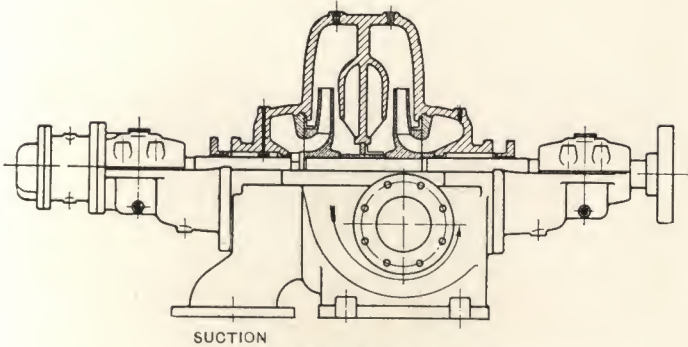


Fig. 1209

Sectional View Two Stage Class "R" Pump.

In this pump both impellers discharge into true volute chambers and no diffusion vanes are used.

It may be stated that, available driving speed permitting, two stage pumps are used for total heads up to 400 feet and four stage pumps for total heads 400 to 800 feet though for certain special service or conditions it may be deemed desirable to use a four stage pump on propositions for much lower total head.

Four stage pumps are almost invariably used for feeding hot water to boilers even though these outfits are generally connected to turbines which permit high speed.

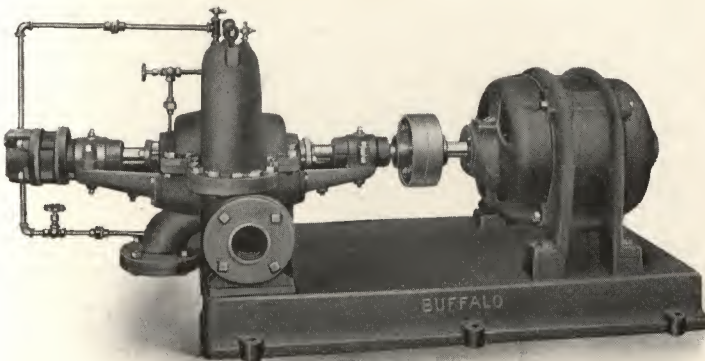


Fig. 1224

2 Inch Class "R" Two Stage Pump, Motor Driven.



Buffalo Multi-Stage Divided Shell Class "R" Pumps

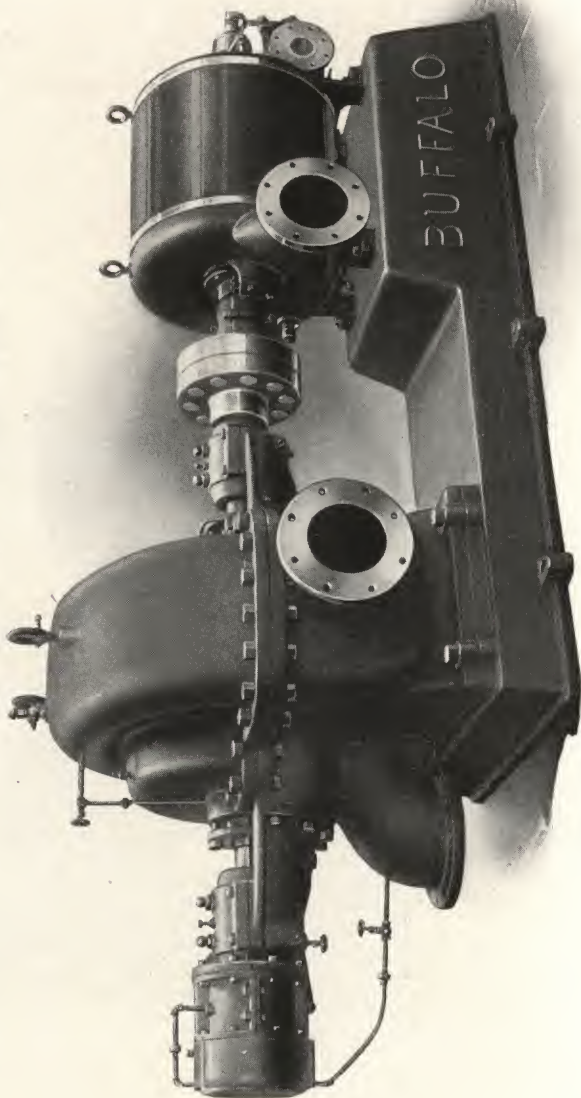


Fig. 1211

8 Inch Two Stage Class "R" Direct Connected to 200 Horse Power Steam Turbine.



Buffalo Multi-Stage Divided Shell Class "R" Pumps

Shells of Standard Two Stage Pumps Good for 400 Feet
Working Pressure; of Standard Four Stage Pumps
Good for 800 Feet Working Pressure.

SPECIFICATIONS

General. This pump is to have a capacity of.....gallons water per minute when discharging against a total head, including suction lift, discharge head and friction of.....feet. Speed of pump to be.....R. P. M.

Type. To be of the horizontal shaft balanced multi-stage type, having enclosed impellers. The suction flange is to be tapped.....inches in diameter, and the discharge flange to be tapped.....inches in diameter.

Casing. The pump is to have a heavy grey cast iron casing, divided on horizontal center-line, suitable to withstand a considerable excess over the working pressure.

Impellers. The impellers shall be of the enclosed type made of hard cast iron, accurately finished and balanced. They shall be mounted on the shaft with feather key. Wide, floating clearance rings are to be furnished. The suction inlet openings shall be opposed to balance the hydraulic thrust.

(Impellers of 2 and 2½ Inch Class "R" Pumps are regularly made of brass, however)

Clearance Rings. Of bronze, with wide, flat wearing surfaces, diameter to be as small as possible.

Suction Connection. The flange opening of the suction connection shall be drilled to fit standard flanges.

Shaft Bearings. Shall be of ample size ring-oiling type, with removable shells, lined with the best quality babbitt metal peined in, reamed true and scraped to a perfect fit.

Thrust Bearing. Marine type, renewable forged steel thrust collars, with renewable babbitted bearing surfaces. Housing to be provided with water jacket to insure oil being kept in perfect condition.

Glands. Shall be of ample length and brass lined, as are the stuffing-box throats.

Water Seal. The suction gland is provided with water seal to prevent the leakage of air to interior of the pump.

Shaft. Will be of the best open-hearth forged steel, brass covered where exposed in pump or glands, finished true and polished, extending through the pump and bearings. The driven end of the shaft shall be fitted with (pulley) (flange) (flexible coupling).

Sub-Base. To be of heavy cast iron, suitably ribbed and stiffened, provided with bosses for anchor bolts and having provision on one end for supporting pump. The sub-base shall be extended to receive the (bearing stands for pulley) (motor) or (steam turbine), and will be provided with suitable machined pads to which to fasten the same.

Finish. All surfaces not machined shall be rubbed down, filled and painted with a suitable dark color before leaving the factory. All machined surfaces shall be left bright and finished.

Fittings. We are to furnish the necessary drain and air cocks, and suitable piping and valve for water seal connections to the suction glands and water jacket on thrust bearing.

Test. Pump to be given thorough running test before shipment.

Special. Bronze impellers, all brass, bronze or "Acid Bronze" construction, etc., at extra price.

(See Table of Sizes and Capacities on Page 13)



Buffalo Multi-Stage Divided Shell Class "R" Pumps

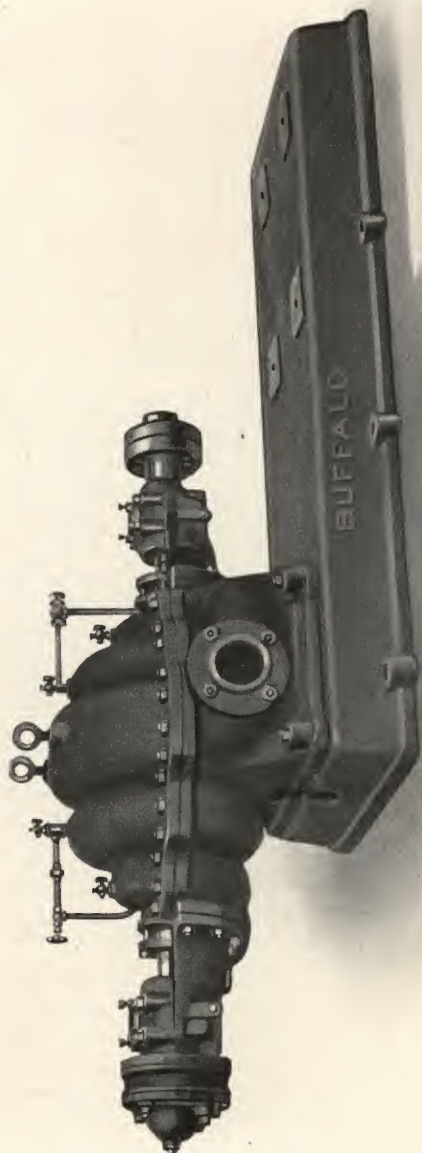


Fig. 1221

Four Stage Class "R" Pump, Direct Connected Type.

(Suction Inlet in this particular pump was Horizontal and on the other side of Pump)



BUFFALO PUMPS

BULLETIN No. 270



Sizes and Capacities Class "R" Pumps

SPECIAL NOTE—Buffalo Multi-Stage Class "R" Pumps are built only for one direction of rotation, i. e., counter-clockwise standing at pulley or motor end of outfit and facing pump with discharge opening on the left hand side.

Size Pump	Pipe Sizes		Ordinary Range Capacity Gals. per Minute		Standard Pulley Diam. x Face Inches	*Code Words (Regular Fitted)		
	Suction Inches	Discharge Inches	Normal	Maximum		Pulley Pump	With Motor Base and Flanged Coupling	With Motor Base and Flexible Coupling
TWO STAGE CLASS "R" PUMPS								
2	2½	2	100	135	6 x 5	<i>Rabah</i>	<i>Rabyn</i>	<i>Racun</i>
2½	3	2½	150	200	7 x 6	<i>Rabej</i>	<i>Racaj</i>	<i>Racwu</i>
3	4	3	225	300	10 x 10	<i>Rabfy</i>	<i>Racby</i>	<i>Racyp</i>
4	5	4	400	530	12 x 12	<i>Rabik</i>	<i>Racek</i>	<i>Radak</i>
5	6	5	620	800	15 x 12	<i>Rabka</i>	<i>Racga</i>	<i>Radca</i>
6	8	6	900	1200	15 x 12	<i>Rabne</i>	<i>Racil</i>	<i>Radel</i>
8	10	8	1600	2000	20 x 16	<i>Rabol</i>	<i>Racke</i>	<i>Radge</i>
10	12	10	2500	3100	22 x 18	<i>Rabsi</i>	<i>Racni</i>	<i>Radim</i>
12	14	12	3600	4500	26 x 22	<i>Rabum</i>	<i>Racom</i>	<i>Radki</i>
14	16	14	5000	6300	30 x 28	<i>Rabwo</i>	<i>Racso</i>	<i>Radno</i>
FOUR STAGE CLASS "R" PUMPS								
2	2½	2	100	135	7 x 6	<i>Ralas</i>	<i>Ralyz</i>	<i>Ranav</i>
2½	3	2½	150	200	8 x 8	<i>Ralda</i>	<i>Ramat</i>	<i>Randi</i>
3	4	3	225	300	12 x 12	<i>Ralet</i>	<i>Ramde</i>	<i>Ranew</i>
4	5	4	400	530	15 x 12	<i>Ralhe</i>	<i>Ramev</i>	<i>Ranho</i>
5	6	5	620	800	18 x 15	<i>Raliv</i>	<i>Ramhi</i>	<i>Raniz</i>
6	8	6	900	1200	22 x 16	<i>Ralow</i>	<i>Ramiv</i>	<i>Ranlu</i>
8	10	8	1600	2000	24 x 18	<i>Ralpo</i>	<i>Ramlo</i>	<i>Ranoz</i>
10	12	10	2500	3100	28 x 20	<i>Raltu</i>	<i>Ramox</i>	<i>Ranpy</i>
12	14	12	3600	4500	30 x 24	<i>Ralux</i>	<i>Rampu</i>	<i>Ranub</i>
14	16	14	5000	6300	32 x 24	<i>Ralry</i>	<i>Ramty</i>	<i>Ranva</i>

*If pump is to have bronze impellers add Code Word *Jcesf*.

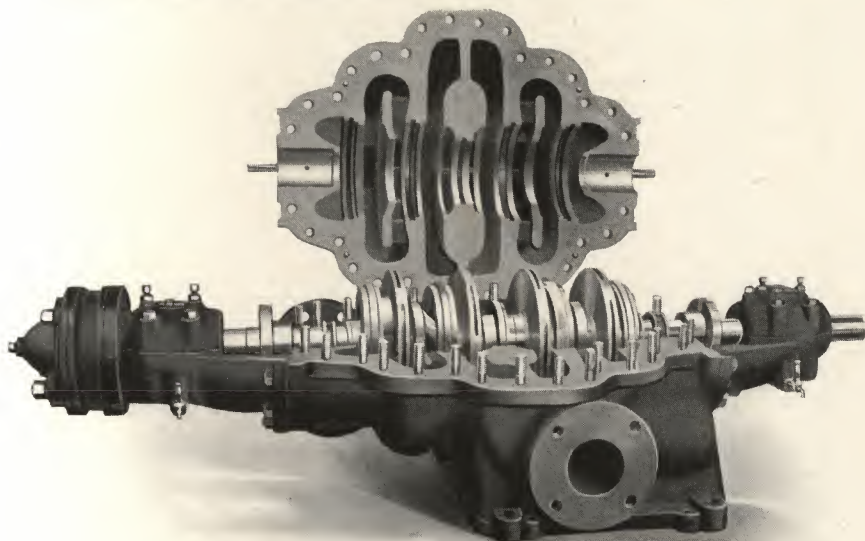


Fig. 1218

Four Stage Class "R" Pump with Upper Half of Casing Raised, Showing Interior.



BUFFALO PUMPS

BULLETIN No. 270

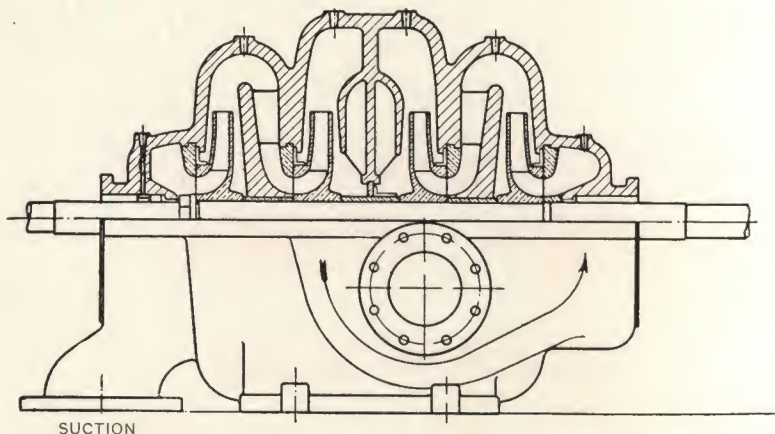


Fig. 1213

Buffalo Class "R" Four Stage Pump

(Compare the number of Clearance Rings in Figs. 1213 and 1215)

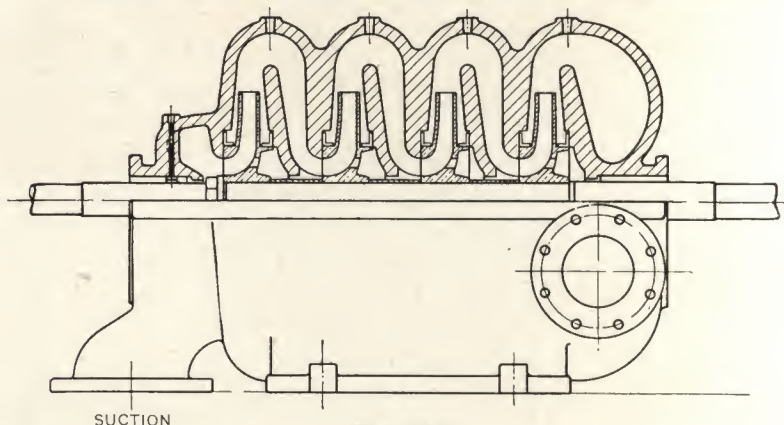


Fig. 1215

Typical Diagrammatic Sectional View of Present Style Multi-Stage Pumps Offered by Other Manufacturers

In Fig. 1215 it will be seen that hydraulic balance is accomplished by a series of balancing chambers, one on the back of each impeller. Any leakage into these chambers will disturb the balance, hence to avoid this holes are provided in the hub of the runners to release this leakage into the suction entrance of impeller. The more the clearance or "wearing rings" wear, the greater will be the leakage and the less the capacity discharged by the pump and the lower the efficiency of the pump. A Buffalo Class "R" Four Stage Pump has only five clearance rings, while a pump with impellers in series like Fig. 1215 has eleven or more than twice as many, to wear out, leak and need replacing.

No clearance rings are needed in the Buffalo Pump, Fig. 1213, between first and second nor third and fourth stages on the shaft because the same pressure exists on both ends of shaft bushing and hence there is no tendency to leakage as there is in the pump shown by Fig. 1215.

Also, regarding pressure on shaft stuffing-boxes, Fig. 1213, if operating against 200 lbs. pressure the pressure on shaft stuffing-box would only be 100 lbs. whereas in Fig. 1215 it would be nearly 200 lbs. and give much more trouble to keep stuffing-box from leaking.



Buffalo Multi-Stage Divided Shell Underwriter Fire Pumps

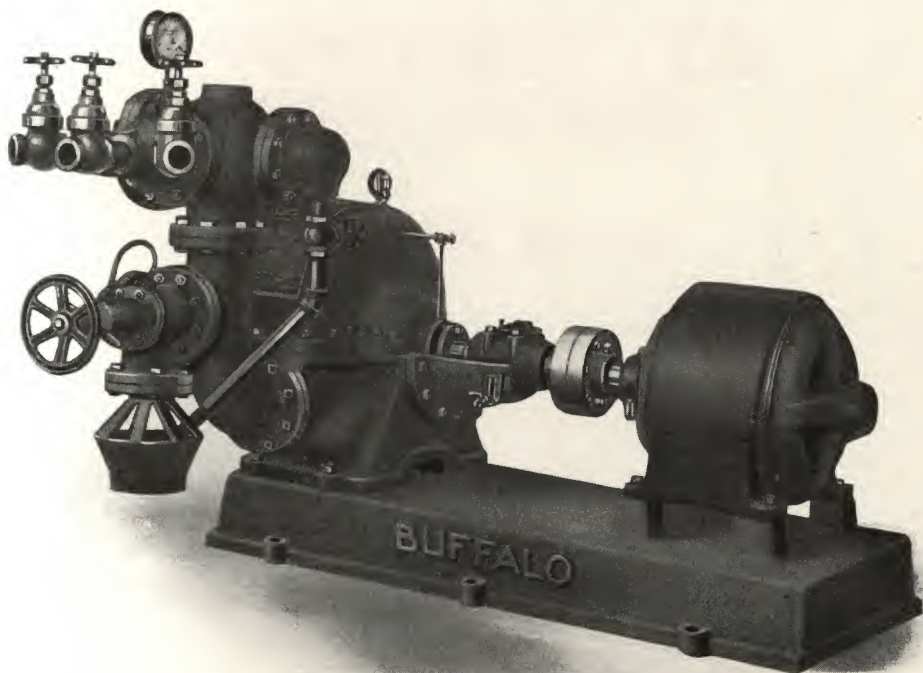


Fig. 1217

750 Gal., Two Stage, Class "R" Motor Driven, 100 Lbs. Discharge Pressure
(Relief Valve furnished only at extra price)

Capacity Gals. per Minute Underwriters' Rating	Size Suction	Size Discharge Opening Connection on Casting	Number of 2½ Hose Valves	Approximate Floor Space Required	Approximate Overall Height	Standard Two Stage Pump
						Code Word Without Motor and Electrical Equipment
500	6"	6"	2	10' x 5'	4' 6"	Qcadh
750	8"	8"	3	10' x 5'	4' 6"	Qcals
1000	8"	8"	4	10' x 5'	4' 6"	Qcanb
1500	10"	10"	6	11' x 5' 6"	5' 0"	Qcarg

Prices include hose valves and gauges. *Relief Valve furnished only at extra price.*

As per the requirements of the Underwriters, with a suction lift of 10 feet or more and a length of pipe exceeding 20 feet, or with more than two elbows, the suction pipe must be 2 inches larger than that shown in the above table, and a special reducing casting must be used to connect this larger suction pipe with the pump.

If motors are shipped prepaid to our works at North Tonawanda, N. Y., we will assemble same with pump. Before shipping motors, secure identifying tags from us.



BUFFALO PUMPS

BULLETIN No. 270



Fig. 421

We manufacture a full line of Single Acting
Triplex Pumps

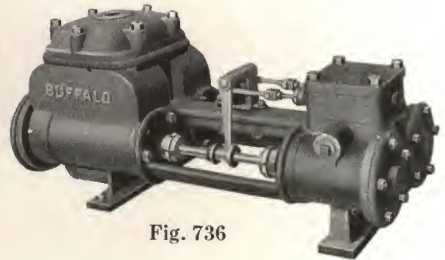
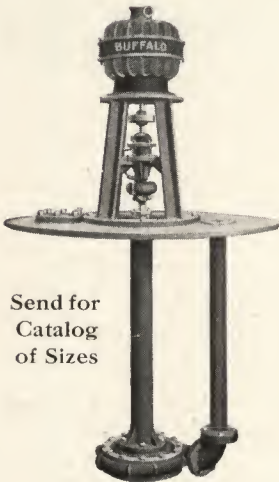


Fig. 736

Ask for Catalog on Single and Duplex
Steam Pumps



Send for
Catalog
of Sizes

Fig. 1105

Buffalo Sump Pump

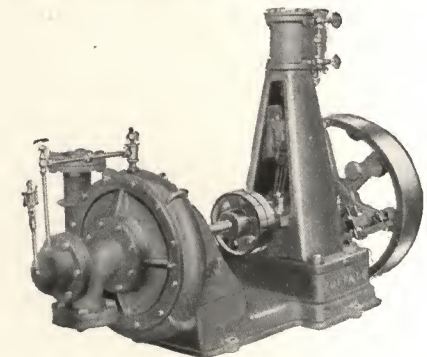


Fig. 970

3 Inch Class "A" Pump, 4 x 4 Class
"O" Engine